

Additively Manufactured Propellant Tanks with Integral Propellant Acquisition Device, Phase I

Completed Technology Project (2018 - 2019)



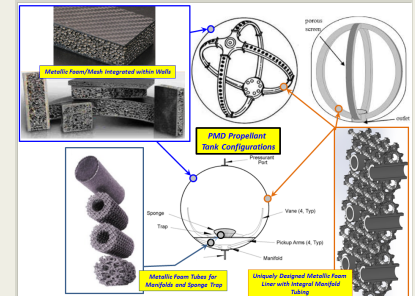
Project Introduction

Advances in additive manufacturing have opened the door to affordable manufacturing of customized hardware components for meeting affordability goals and minimizing life cycle costs. Developing and offering a common, affordable, and efficiently packaged cryogenic propellant management solution for spacecraft and satellite systems would be openly welcomed within the industry.

Leveraging years of AFA's AM experience with materials and processes coupled with commercially available design optimization software can support the development of innovative liquid acquisition devices. By employing our matured design for additive strategies coupled with effective commercial software tools we can design optimized internal lattice networks that are either as an independent LAD or as part of a wall's skin in a continuous network to meet different structural load requirements and design targets such as LAD pore size and geometry. Using a bio-inspired artificial intelligence modeling suite for designing a randomized lattice structure to serve as a LADs vane or screen offers us full control over pore size and lattice strut thickness which can improve performance/effectiveness while reducing mass with improved volume efficiency.

Anticipated Benefits

Propellant management devices
 Propellant filters and flow control devices
 Transpiration cooled panels and components
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 Transpiration cooled panels and components



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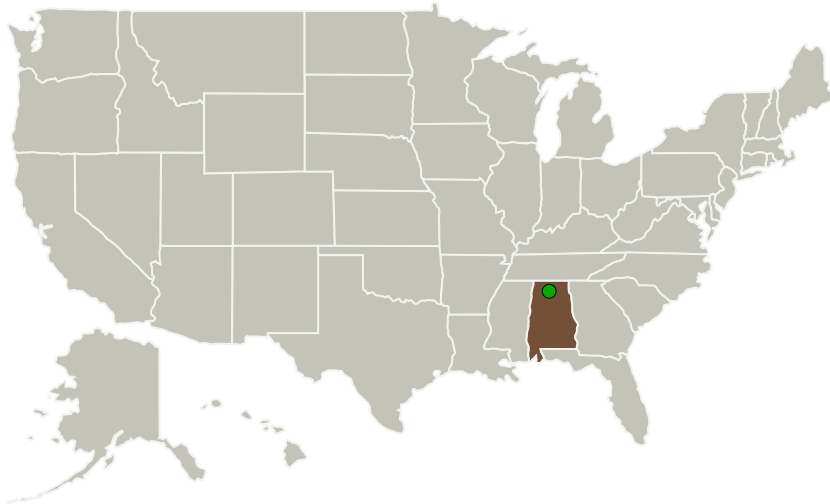
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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
ASRC Federal Astronautics, LLC	Lead Organization	Industry	Huntsville, Alabama
● Marshall Space Flight Center (MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama

Primary U.S. Work Locations

Alabama

Project Transitions

**July 2018:** Project Start**February 2019:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/141235>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

ASRC Federal Astronautics, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

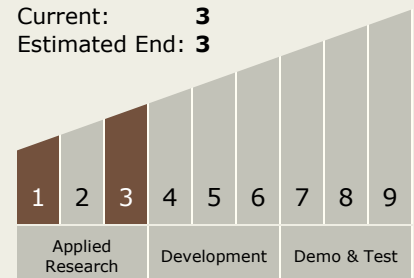
Carlos Torrez

Principal Investigator:

Joseph Sims

Technology Maturity (TRL)

Start: **1**
 Current: **3**
 Estimated End: **3**

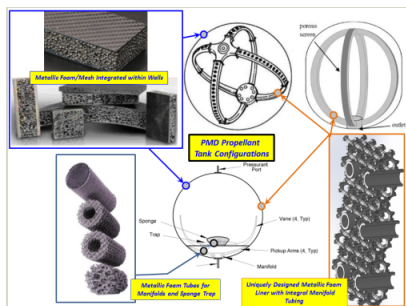


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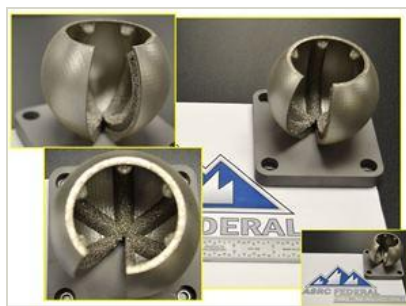


Images



Briefing Chart Image

Additively Manufactured Propellant Tanks with Integral Propellant Acquisition Device, Phase I
(<https://techport.nasa.gov/image/125959>)



Final Summary Chart Image

Additively Manufactured Propellant Tanks with Integral Propellant Acquisition Device, Phase I
(<https://techport.nasa.gov/image/130176>)

Technology Areas

Primary:

- TX01 Propulsion Systems
 - └ TX01.1 Chemical Space Propulsion
 - └ TX01.1.1 Integrated Systems and Ancillary Technologies

Target Destinations

Earth, The Moon, Mars